Name of the Factory	:	Abc Knit Dyeing & Finishing Mills Ltd.
Address of the Factory	:	Plot #1, 3, &5, Road#14/A, Shampur, Kadamtali, Dhaka., Bangladesh.
Present Status of the Factory	:	Under Operation.
Structural Assessment Conducted by	:	VEC
Date of Structural Inspection	:	3rd February, 2015
Fire Assessment Conducted by	:	VEC
Date of Fire Inspection	:	3rd February, 2015
Electrical Assessment Conducted by	:	VEC
Date of Electrical Inspection	:	3rd February, 2015
BGMEA Membership No.	:	4725.
BKMEA Membership No.	:	238.

BASIC INFORMATION:

The assessed factory building was a 5 -Storey RCC building. Based on the document review, the building has approval for 6 stories. 1st, 2nd, 3rd and 4th story were constructed in 1996-1997; while 5th and 6th story were partly constructed in 2003 which cover approximately 30% of the floor plan. 6th story is a non-engineered tin shed. The structural system of the 5 storied building is RCC beam column frame and beam slab floor system. Abc Knit Dyeing & Finishing Mills Ltd. operates in the entire building. The following information was noted:

i.	Building Usage Type	:	Garment Factory.
ii.	Structural System	:	RCC beam column frame system.
iii.	Floor System	:	RCC beam slab system.
iv.	Floor Area	:	Total floor area is 88176 sft.
v.	No. of Stories	:	5 storied plus tin shed.
vi.	Construction Year	:	Building was built in two phases. The first phase of construction is in 1996-1997 & another phase is in 2003.
vii.	Foundation Type	:	Pile foundation.
viii.	Design Drawings	:	Available: approval drawings, as built structural drawings, Architectural drawing, as built machine layout plan and soil test report. Not available: Floor load plan and material test report.
ix.	Soil Investigation Report	:	Available.
x.	Construction Materials	:	Brick aggregate. (Identified by removing plaster)
xi.	Generator	:	At Ground floor.

RECOMMENDATIONS FOR CORRECTIVE ACTION:

The recommendations of corrective action for both Structural and Fire & Electrical Safety comprises in Short Term, Mid Term and Long Term basis.

The recommendations for **Structural Safety** corrective action are:

Short Term (Immediate) : None.

Mid Term (6-weeks) :

- Provision should be kept for proper ventilation. Water proofing coating should be applied on the exterior surface.

Long Term (6-months) :

- A qualified structural engineer should be involved for maintenance by correcting the identified issues for dampness.
- Continue to implement load plan and manage floor loading.
- Provide protection coating on the exposed rebar to prevent corrosion.

The recommendations for **Fire & Electrical Safety** corrective action are:

(A): Recommendations for Fire Safety corrective actions:

Immediate (*the factory should not continue to be occupied until these non-conformities have been rectified*):	N/A
Short Term (*Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity*	• Factory needs to conduct fire drill quarterly (4 times a year) under the fire safety plan and needs to kept the written record of such drills for at least 3 years for the inspection of fire brigade whenever called for. • Factory needs to have marked aisles in all working floor according to 0.9m for one side seat and 1.0m for both side seat. • Lights in storage area needed to be installed with protective covers and conduits. • Combustibles are to be managed with good housekeeping. Storage facilities with no air-conditioning duct shall be minimum 2.9m and when used as a storage facility there shall be a minimum clearance of one third the floor height from the ceiling to the top of the storage stack. • All required means of exit or exit access in buildings or areas requiring more than one exit shall be signposted. The signs shall be clearly visible at all times, where necessary supplemented by directional signs. • Potable fire extinguisher needs to be installed as an approved type and installed as per manufacturer's instruction and placed near the path of exit travel where easily accessible.
Mid Term (*The remedial works indicated must be carried out within a period of 6 weeks)*	• Factory needs to prepare as built drawing with floor machine layout showing means of escape with proper dimension. • Fire manager/Director need to have safety training from proper authority & worker of the factory should as far

	as possible be trained for use fire extinguisher. • All the exit doors need to be replaced by side swinging so that un-lockable doors can be opened easily in the direction of evacuation without the use of a key. • Factory needs to provide handrail on both sides of all the stairways. • Factory needs to provide intermediate handrail both of the stairways as per the requirements of NTPA guideline. • Factory needs to be installed with adequate illuminated emergency lighting in floors, exits & stairs.(Escape route). • Emergency back-up power needs to be connected for critical fire safety system and not less than 30 minutes in case of failure of power supply.
Long Term (*The remedial works indicated must be carried out within a period of 6 months)*	• Factory needs to have a proper pre-plan for fire department. • Final exit route-1(Stair-1 route) need to be protected (2 hours rated construction with 1.5 hours rated door) at each floor level entrance and need to be protected from generator and boiler shed at ground floor by 4 hours rated construction with 2 hours rated door/opening, also need to have a protected escape route till to reach safe refuse area. • Child care room is needed to be separated from other occupancies with 3 hours fire rated construction with 3 hours fire rated door. • Storage area need to be protected with 2 hours rated construction and 1.5 hours rated opening or doors. • Generator: Generator room need to be protected with 4 hours rated construction & 2 hours rated opening / door from stair-1 as well as from the final exit route-1 located beside of the shed at ground floor. • Boiler: Boiler room need to be protected with 4 hours rated construction & 2 hours rated opening / door from stair-1 as well as from the final exit route-1 located beside of the shed at ground floor. • All the exits connecting to the staircase-1 and staircase-2 need to be protected with fire and smoke resistant enclosures and opening (2 hours rated enclosure and 1.5 hour rated door) and provide a protected route from all

	though the stairway to the final exits. • Factory need to install centralized and automatic fire detection & alarm system on all occupied floors, including other tenanted floors of the building as per NTPA Guideline. • The factory needs to install manually operated electrical fire alarm system and automatic fire alarm system with single or multiple call boxes on all occupied floors, including other tenanted floors of the building. • Factory needs to install control panel for centralized automatic smoke detection & fire alarm system according to NTPA Guideline. • Factory needs to install proper standpipe system with having at least 75 mm dia of riser. • Factory need to be installed by 1 riser per 1000 sqm of floor area with at least 38 mm dia of fabric hose with variable nozzle. • Factory need to install standard standpipe, hose and fire pump system to ensure required hose pressure as per NTPA Guideline. • Factory needs to be installed with Siamese connection for to the standpipe system located outside the building and accessible to the fire department connection. • Factory needs to have dedicated fire pump with backup power system & sufficient capacity for achieve required pressure in the remote place of the factory. • Factory needs to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment and at least 1900 x 75 = 142500 liters water storage tank.

(B): Recommendations for Electrical Safety corrective actions:

Immediate (*the factory should not continue to be occupied until these non-conformities have been rectified*):	• Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point,) of overheating (> ambient+ 40^0C) and take proper action.
Short Term (*Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity*	• Discharge the generator exhaust to the exterior of the building in a safe location. • Ensure all distribution boards (including panel door) are earthed properly. • Remove all unused cables from distribution boards and make sure all necessary cables are properly terminated at its point of termination using appropriate size and

	type of lug. • Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit. • Ensure proper earthing connections at all electrical equipment. • Clean interior components from dust and debris and seal all openings within the enclosure to prevent dust and debris from entering. • Provide provision for inspection of all earthing system and ensure inspection is being completed and documented.
Mid Term (*The remedial works indicated must be carried out within a period of 6 weeks)*	• Install appropriate number and type of safety signage and fire-fighting equipment at substation and generator room. Also ensure graded rubber mats are provided in front of all distribution boards. • Ensure in the substations room and generator room, all working place, exit light and escape light have adequate illumination level as per standard. • Fill the transformer breather with fresh Silica gel and oil cup with fresh Oil. • Provide two separate and distinct connections of earthing for each generator. • Provide dedicated & adequate size of earthing with proper identification for each circuit from the earth bus-bar of distribution boards and ensure continuous earth path is back to main building intake. • Rewire to ensure each incoming supply to an MCB has a dedicated supply from busbar. Avoid the use of multiple cables on outgoing side of MCB's. • Ensure all electrical cables are sized according to capacity of circuit breakers. • Provide adequate support or mechanical guards for electrical equipment and wiring where necessary. • Ensure cable joints are made in respect of conductivity, insulation and mechanical strength. • Provide emergency power connection for life safety loads (fire alarm, fire pump, emergency lighting, exit

	signage, etc.). • Connect all metal in the building to the building earthing system. • Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point,) of overheating { ambient+(20^0C-40^0C)} and take proper action.
Long Term (*The remedial works indicated must be carried out within a period of 6 months)*	• Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system. • Provide adequate means of ventilation for the substation room based on the installed equipment considering fire barriers. • Ensure the generator room has adequate fire separation from the production area. • Provide adequate means of ventilation for the generator room based on the installed equipment considering fire barriers. • Ensure appropriate generator room size in order to properly access the generator to perform routine maintenance activities. • Ensure distribution boards have no opening and all live internal components are concealed properly. • Ensure distribution boards are installed in compliant locations in terms of height, access and surrounding weather. • Provide dedicated & adequate size of neutral with proper identification for each circuit. • Ensure each distribution board is provided with a circuit list and means of identification is provided as per list. • Provide proper cable terminator/connector for stranded conductors at its point of termination. • Install separate distribution boards for lighting and power circuits and lightning protection system on the building.